PRESS RELEASE
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INDIA METEOROLOGICAL DEPARTMENT

Long Range Forecast
For 2011 South-west Monsoon Season Rainfall

1. Background

India Meteorological Department (IMD) follows a two-stage forecasting strategy for long range forecasting of the south-west monsoon season rainfall over the country as a whole. The Long Period Average (LPA) of the south-west monsoon season rainfall over the country as a whole for the period 1951-2000 is 89cm. The first long range forecast for the south-west monsoon season (June-September) rainfall is issued in April and the forecast update is issued in June.

From 2007 onwards, IMD has been using the following statistical models for preparing quantitative and probabilistic forecasts of the south-west monsoon rainfall (June – September) for the country as a whole:

a) A 5- parameter statistical ensemble forecasting system requiring data up to March, for the first forecast in April.
b) A 6- parameter statistical ensemble forecasting system requiring data up to May for the forecast update in June. Three of these 6-parameters are same as that used for April forecast.

For preparing the first stage forecast for the 2011 South-west monsoon rainfall for the country as a whole presented here, the 5-parameter statistical ensemble forecasting system has been used.

2. Operational Statistical Forecast System

In the IMD's Ensemble Statistical Forecasting system for April forecast, the following 5 predictors are used. The model error of the April forecasting systems is ±5%.

S.No	Predictor	Period
1	North Atlantic Sea Surface Temperature	December + January
2	Equatorial South Indian Ocean Sea Surface Temperature	February + March
3	East Asia Mean Sea Level Pressure	February + March
4	NW Europe Land Surface Air Temperature	January
5	Equatorial Pacific Warm Water Volume	February + March

The 5-parameter ensemble statistical forecasting system was also used to prepare probability forecasts for five pre-defined rainfall categories. These are deficient (less than 90% of LPA), below normal (90-96% of LPA), normal (96-104% of LPA), above normal (104-110% of LPA) and excess (above 110% of LPA). The forecasted probabilities in percentage based on this system for the above 5 categories are 6%, 30%, 53%, 10% and 1% respectively.

3. Experimental Forecasts

IMD has an experimental dynamical forecast system. The experimental ensemble dynamical forecast for the 2011 south-west monsoon rainfall was computed as the ensemble average of 10 member forecasts with forecasted sea surface temperatures (SST) as boundary SST forcing.

In addition, IMD has taken into account the experimental forecasts prepared by the national institutes like Indian Institute of Tropical Meteorology, Pune, Indian Institute of Science, Bangalore, Space Applications Centre, Ahmedabad, National Aerospace Laboratories, Bangalore, Centre for Mathematical Modelling and Computer Simulation, Bangalore, National Centre for Medium Range Weather Forecasting, Noida and Center for Development of Advanced Computing, Pune. Operational/experimental forecasts prepared by international institutes like the National Centers for Environmental Prediction, USA, International Research Institute for Climate and Society, USA, Meteorological Office, UK, the European Center for Medium Range Weather Forecasts, UK , the Experimental Climate Prediction Center, USA, and World Meteorological Organization's Lead Centre for Long Range Forecasting - Multi-Model Ensemble were also taken into account.

The experimental forecasts from majority of the statistical and dynamical models suggest below normal to normal monsoon season rainfall over the country as a whole.

4. Sea Surface Temperature Conditions over the equatorial Pacific & Indian Oceans

The El Niño conditions that were originated since June, 2009 peaked in December 2009 and then started to weaken to reach ENSO-neutral conditions in May, 2010. This continued till mid June when weak La Nina conditions emerged. The La Niña conditions strengthened subsequently and become moderate to strong during mid-August 2010 to early February 2011. The La Nina conditions since have weakened to weak to moderate strength as of mid-March 2011. The latest forecasts from a majority of the dynamical and statistical models indicate strong probability for the present La Niña conditions to continue till June. Subsequently the La Nina conditions are expected to weaken further to reach ENSO- neutral conditions. However, it may be mentioned that the climate forecasts prepared at this time of the year has large uncertainty.

It is important to note that in addition to ENSO events, other factors such as the Indian Ocean Sea surface temperatures (SSTs) have also significant

influence on Indian monsoon. Recent forecasts from some coupled models suggest possibility of the development of a weak negative Indian Ocean Dipole event during the second half of the year, which may not have much impact on the Indian monsoon.

As the extreme sea surface temperature conditions over Pacific and Indian Oceans particularly ENSO conditions over Pacific (El Nino or La Nina) are known to have strong influence on the Indian summer monsoon, IMD is carefully monitoring the sea surface conditions over Pacific and Indian oceans.

5. Forecast for the 2011 South-west monsoon rainfall

IMD's long range forecast for the 2011 south-west monsoon season (June to September) is that the rainfall for the country as a whole is most likely to be Normal (96-104% of Long Period Average (LPA)). There is very low probability for season rainfall to be deficient (below 90% of LPA) or excess (above 110% of LPA).

Quantitatively, monsoon season rainfall is likely to be 98% of the LPA with a model error of ± 5%. The LPA of the season rainfall over the country as a whole for the period 1951-2000 is 89 cm

IMD will update the above forecast in June 2011 as a part of the second stage forecast. Along with the update forecast, separate forecasts for the monthly (July and August) rainfall over the country as a whole and seasonal (June-September) rainfall over the four geographical regions of India will also be issued. Forecast for the rainfall over the country as a whole during the second of the season (August + September) will be issued in July and that for September will be issued in August.
